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THE AMERICAN COLLEGE FOR GERMANY[1]

IT seems so natural and so delightful to listen on such festival days of college joy and of college pride to the voices of men whose memories are intertwined with the noble traditions of the celebrating college. Those who passed the happy days of inner growth from the immaturity of school work to the maturity of life work on the lovely campus of Lafayette are the welcome speakers, indeed, at this symposium on college ideals, and their words, filled with gratitude, transform this huge assembly into a mighty family circle. But harsh and disturbing seems in such hours of intimacy the word of an outsider who never before enjoyed the charm and the inspiration of this place. If you are yet generous enough to invite the stranger's intrusion into your assembly of alumni; yes, if you kindly welcome the messenger of the Harvard faculty, your motive, it seems, can be only one: on such a day of historic retrospection Lafayette College desires to acknowledge the unity of the country's growth and academic development, desires to remember, venerable to-day herself, those places of learning which were venerable when she began her successful career, and therefore looks back in friendly fellowship to the oldest university of the land. Simple arithmetic leads us quickly back to those ancient days. It was seventy-five years ago that Lafayette College was born; if we double the figure, exactly 150 years ago, in 1757, the gallant Frenchman was born for whom this college was named; and if we double that figure, exactly 300 years ago, in 1607, was born the pious Englishman who founded the first American college, John Harvard. What a glorious national development in the life-

[1] Address at the celebration of the seventy-fifth anniversary of the founding of Lafayette College.

time of a few generations! John Harvard's foundation is flourishing to-day in the midst of hundreds of other colleges, of which even the least stands higher than the Harvard of the old days. And Harvard College never looked with misgivings on the wonderful growth of her young rivals; on the contrary, Harvard knew that her own steady progress resulted first of all from the spreading of the collegiate spirit over the country; every college which devotes itself with earnestness to the high task helps every other college, and if a younger institution can prove that through three quarters of a century it has lived up to the noblest ambitions and to the most idealistic hopes, then it is a matter for sincere rejoicing to the older colleges, and for none more than to the oldest. To be allowed to bring to you to-day the message of such Harvard sentiments and the sincere congratulations of America's largest university, is the privilege which makes me most grateful.

But I feel that your choice of a speaker must have been influenced by still another motive. To bring on such collegiate occasion the greetings of another college, you would have hardly selected a man who, as you know, never went through an American college at all. You ask a foreigner, and I can not help feeling that he was meant to come to-day as such a messenger from the non-American world. On your celebration day, which is in any case a day of pride for all American colleges, you desire not to miss in the chorus a voice of appreciation from those lands which never knew, and do not know to-day, a counterpart of the American college in their own educational systems. "To see ourselves as others see us" is always a most natural desire—natural when we are dissatisfied and want the criticism of the outsider in the service of reform, but still more natural when, as to-day, the work has been tested and has been found successful beyond hope. It seems to me, therefore, that I may enter best into the spirit of this hour if I emphasize less that I am a teacher in another American college, and emphasize more that I was a student of no college whatever; in short, that I come to you as a German with an education "made in Germany," and thus with an inborn tendency to look on every new life experience from the German standpoint and with German prejudices.

And yet I come to sing a song of praise for the American college. I believe in its mission, and, in spite of the pressure from the high schools below and from the professional schools above, I believe in its essentially unchanged future. I see in the college the most characteristic expression of the American genius, the most important condition for the healthy development of the national life. I can calmly use such high-pitched phrases, as I am weaponed against the suspicion that my enthusiasm may be invented for this special occasion. I have sufficient witnesses in print to prove that this is not flattery made up for my commencement part. No, whenever I have spoken to my German countrymen, for instance, in my book on the Americans, written entirely for German consumption, I have said in definite words, "The college is the soul of the American nation."

Of course, I am not blind to the wonderful achievements in all the other parts of the educational system, from the kindergarten of the city suburb to the professional institution of the large university. The energy with which the American primary school shapes the little descendants of a score of races into the uniform product of the future American citizen, is admirable and marvelous. And the progress which in the last two decades scientific research and productive scholarship have made in

the highest graduate schools of the New World, justly surprises the Old World. Yet the most beautiful feature remains, after all, the quiet intellectual and moral work done in the college halls from the Atlantic to the Pacific. It was my growing acquaintance with the college life that gave me ever new inspiration to tell my countrymen the story of American idealism. You know the traditional European prejudice did not admit that idealism could be at home here. America seemed the land of commerce and industry, and all for the sake of gold; the wild chase for outer gain seemed the whole meaning of American effort. No wonder that every educated European who comes with open eyes and has a chance to see not only the outer, but the inner life, feels still to-day like a belated Columbus, who has yet to discover the true America, the land of ideal desires and ideal energies. And certainly, of all idealistic emotions of this people, there is none deeper, none purer, none more blessed, than the demand for instruction, for learning, for self-perfection, with its climax in the desire for collegiate education.

I do not want to be misunderstood, as seeing no fault in the American system of instruction. There are not a few wrong tones in the symphony, wrong tones which hurt the ear of the newcomer, discords to which he will never become insensible. But those fundamental errors belong rather to the school than to the college. It is enough to point to the most devastating one: the lack of mental discipline at the very beginning of intellectual growth. The school methods appeal to the natural desires, and do not train in overcoming desire; they plead instead of commanding, they teach one to follow the path of least resistance instead of teaching to obey. The result is a flabby inefficiency, a loose vagueness and inaccuracy, an acquaintance with a hundred things and a mastery of none. Public life has to suffer for it; a community which did not get a rigid mental discipline through home and school influence must always remain the plaything of the lower instincts. Such a community will continue to follow without check its untrained impulse; it will prefer the yellow, big headline paper to the serious newspaper which appeals to sober thought; it will prefer on the stage of the theater and on the stage of life the vulgar vaudeville and the cheap melodrama to the refined and the noble play; it will be impressed by every glaring outer success and by showy size, by quantity instead of quality and value; it will be swept by every passion of the crowd, applauding mediocrities, enthusiastic for every one who poses for the uncritical, and a quick victim of every short-sighted fancy. And yet can there be any doubt that it is just a political democracy which ought to be protected against such an inner foe? And no one has to suffer more from these sins of the school than the college. How much more the American college might have been able to produce if it could have received into its freshman class young disciplined minds, trained in accurate and careful learning, and in the restraint of primitive impulses. The college would not have been burdened by wasting much of its costly time in repeating the elements of learning and patching up the slang-disfigured English language. It would not have been vexed by the hysterical excitement which so often turns the recreating pleasure of sport into a ruinous passion.

But I would rather contemplate, and must admire the more, what, in spite of all these hindrances, the American college has made and makes to-day and will make in the future out of the entering freshman in the few years until he receives his bachelor diploma. He came as a boy and goes out

as a man. He came from a school where ready-made knowledge was imparted to a passive immature mind; and, when he leaves, he goes out into the world for practical work or professional schooling with that senior maturity which relies on independent judgment. Secluded from the rough battle of the outer world, he can pass four years of inner growth and self-development, of learning and comradeship under the influence of scholars who devote their lives with ever-young enthusiasm to all that is true and good and beautiful. He does not seek there, and ought not to seek there, the specialized research work which belongs to the graduate school. Certainly investigation, which focuses the energies of a whole man on a circumscribed field, is the highest aim of scientific study; but it fits a professional specialist only, who has completed his broad course of general culture. This broad culture alone is the abounding gift of the college, secured by those methods which can not be those of the school-teacher nor of the researcher. Neither the time before the college, nor that after the college years, can open the heart and widen the mind, can inspire enthusiasm and deepen the personality like college days passed in living contact with true college teachers —and no one is a true college teacher who does not make even the most abstract science a living and refreshing source of culture and humanity.

It is this breadth of culture gained in work and in play, in the class room and in the club, in the laboratory and in the chapel, which gives unity and community to all who have had the good fortune of collegiate education. Whether their way leads on to law or medicine, to banking or railroading, to teaching or preaching, to politics or commerce, makes no essential difference; essential remains only that which is common to all of them. The professional work seems, then, only like a garment which can be laid off; the collegiate work belongs to the personality itself. It is this phalanx of the collegiate alumni which has to represent the educated public opinion, imparting to the nation the thoughtfulness and earnestness without which the trivial instincts of the crowd would be unchecked. When the masses, misled by the coddling education of early youth into a happy-go-lucky spirit, rush into the path of the cheap and vulgar, it is the collegiate community which has to prove its belief in lasting values. When the masses act in the laissez-faire temper, which begins with the lack of discipline in the schools and ends with the indulgence of public graft and corruption, it is the collegiate community which must show its training in the spirit of civic duty and lofty ideals.

You all know that there is one way of praise which is more eloquent and significant than any words of enthusiasm, and it is the effort of imitation. The value which belongs, in my opinion, to this unity of collegiate culture and to this national community of the best educated men, independent of their various activities in later life, can easily be measured by this strongest test. With sincere devotion I have upheld the, at first sight, revolutionary proposal that Germany should imitate the American example and found colleges on German ground. What is the situation over there at present? Every one knows that the German universities are not surpassed by any scholarly institutions the world over. It is not by chance that for nearly a century a steadily growing stream of young American scholars has poured through Göttingen and Heidelberg and Giessen and, later, through Leipzig and Munich and Berlin. And those young scholars brought back with their German Ph.D. the spirit of sacred devotion

to the true advancement of knowledge and to productive research; that spirit which founded in the last three decades the famous graduate schools of Johns Hopkins and Harvard, of Columbia and Yale and Chicago, and which spread thence to all the graduate departments of the large universities. But these model universities of Germany are not and were never intended to be colleges in the American sense, and whoever, misled by the loose application of the word university in this country, carelessly plays with the comparison needs only to be reminded that the strong intellectual life of Germany is satisfied with twenty academic institutions, while the United States has nearly six hundred. The kingdom of Saxony has only one, the University of Leipzig; while the city of New Orleans alone has four. It is evident, therefore, that institutions are in question which are not to be compared. The German university is a system of professional schools, conducted by the state for the intellectual training of the future physicians and lawyers, ministers, teachers and scholars. They have been just that for nearly six hundred years. Their unity lies in their method; the teachers are productive scholars who impart to their students not information, but the critical attitude and scholarly independence of judgment. But this method presupposes intellectual maturity and expansive knowledge. The entrance conditions presuppose, therefore, an amount of information which about equals that which the average junior of the better American college is expected to acquire. This goal is reached two years earlier than in America through the stricter mental discipline in the schools, and it is reached entirely by school methods.

All this has necessary consequences. There is no middle ground between the school and the professional or graduate university department. The boy, who at nineteen leaves the gymnasium in his native town with all its school discipline, enters the freedom of the university only to study law or medicine, science or divinity. The freedom of academic life comes thus exclusively to those who enter the so-called professional careers. Those, on the other hand, who want to go over into practical life, perhaps into industry or commerce, have no opportunity for contact with the university. They are confined to the limitations of the schoolroom, and, as they do not aim at the entrance examinations to the university, they are inclined to prefer from the first schools with a simpler curriculum.

If we consider that this has been the situation for centuries, it becomes evident that the result must be a public situation entirely different from that of the United States. Here in America it was, of course, also from the first necessary to have schools for ministers and lawyers and so forth, but they were considered as private affairs, and every one had a right to enter practically without any previous education. Public opinion was thus imbued with the correct idea that these professional studies did not in themselves guarantee a high level of culture. The real culture, on the other hand, the making of a gentleman, was left to the college, which was taken over from England. The collegiate alumnus is thus the cultural leader. He may be later a preacher or a banker, a physician or a railroad man. Of course, the entrance condition to the professions was slowly raised. The highest professional schools to-day demand the bachelor degree at their threshold. Yet the old historical conviction has remained; not the professional, but the collegiate study gives to a man the stamp of the highest education. How could it be otherwise in a country which had to bend all its

massive energies toward the opening of the gigantic land, toward the building up of its democratic commonwealth, and which had thus for a long while little leisure for science and art, for scholarship and literature? How could it be that the business men and the men of affairs would be ranked there behind the professional specialist?

In Germany the opposite development has led historically to the opposite valuation. The professional men, who alone through centuries had the privilege of widening their minds in the atmosphere of the university, had to stand, therefore, in public opinion high above the men of practical interests who had nothing but a school diploma. To go into business or industry and practical affairs thus meant a second-class occupation, with which those had to be satisfied whose brain or whose pocket-book did not allow those years of university study. Every social premium and every social ambition became attached to these learned professions, in common only with the position of the nobleman and the army officer, who, for historic reasons of another sphere, seemed equally exalted beyond the masses of those pitied money-makers. And this traditional prejudice was in good harmony with the Germany of the day before yesterday, when the population was poor and their leaders were poets and thinkers.

But the times have changed. Just as America has added to its material culture a rapidly growing ambition to rival the Old World in the production of science and art, so Germany has added commercial and industrial ambition to its spiritual aims. Germany has grown prosperous, a mighty rival in the markets of the world. There may be not a few who complain of this rapid Americanization of the world, but they can not change the fact that the Germany of William II. is no longer the Germany of Schiller and Kant. With political unity, with the inheritance of Bismarck's constructive work, with the triumphs of Germany's technique and industry, a thorough change in the social estimate has set in. The practical walks of life are more honored day by day; the sons of the best families press on more and more into the economic life, and thus it becomes daily more incongruous that the inspiring influence of academic life should be withheld from all those who do not seek a professional career. To attend the present universities and technical schools with their specializing professional work would be, indeed, inappropriate for them. That which is needed for the Germany of to-day, and still more for the Germany of to-morrow, is an academic institute of a new type—a university where the full freedom of academic life can be joined to studies of purely cultural character, where young men may enter two years before they have reached the present goal of the professional university, and where a three or four years' course would prepare them for the duties of life without any thought of their later occupation; in short, what is needed to-day is, in its essentials, an American college.

Of course, there would be hardly any chance for new experiments in the famous old universities. They are certainly rejuvenating themselves steadily by adding new departments and introducing new methods, by admitting women as regular students, and so forth; but the development must remain an internal one without an external change of the classical form and of the framework of the four professional faculties. The whole state organization is too closely bound up with the system of the university and the gratitude of the nation too much attached to its time-honored features to allow any tampering in the interest of the unprofessional disciplines. A new foundation would thus be the better oppor-

tunity, and, if possible, a foundation in one of the smallest federal states in which no other university exists and in which, therefore, no traditions are to be broken and no academic inequalities to be feared. Good luck seemed to open such opportunity. The little state of Hamburg, which is practically the large old Hansa city and its surroundings, has no university. It is the greatest commercial place of the country, and the vivid pulsation of its economic life seems to have excluded for centuries the idea of a real university. But in recent years a sentiment has grown among her leading citizens that Hamburg ought to become not only the center of seafaring, but a center of intellectual influence as well. Large donations from rich Hamburgians were in sight, and the state government seemed inclined to yield to the public demand. In this situation the president of the supreme court, who was the soul of the whole movement, invited me in the name of friends to make suggestions for the new university and to elaborate a plan. I did so, and the gentlemen over there published my voluminous memoranda as a pamphlet last year. It has been discussed beyond expectation. It has been heartily welcomed by many and has been sharply attacked by not a few who wish the new university in Hamburg to follow exactly in the path of the old ones. Wealthy citizens have given millions during the last year and there is now no doubt that Hamburg will have a university in a not far distant time.

Whether that new institution of the future will realize some of these suggestions, no one can say to-day. But if I had to bring the plans which I sketched for it into a short form, I should say: my scheme proposed to erect a German university with the substructure of an American college. My model was naturally Harvard, not only because I knew her best, but because Harvard is the only American university which has, besides its college, a graduate school of arts and science, a law school, a medical school and a divinity school, and which demands for all four of these professional faculties a bachelor degree as entrance condition. The idea was that in Hamburg, just as in Harvard, the youth ought to get in common in years of academic freedom the inspiration of cultural work in history and economics, in literature and philosophy, in art and natural science, before their ways are divided to go either to the professional schools of the typical German university or to the practical enterprises which commerce or industry or agriculture or politics may offer. While many new technical schools have sprung up with the new requirements of our practical age, Germany has not founded a university anew for a whole generation. The spirit of the Germany of to-day has not yet found its real characteristic expression. If Hamburg really has the courage to add to the old German plan an American college, then its university will be significant for the German Empire of to-day just as the foundation of the University of Berlin a hundred years ago was an expression of the new moral energies of the ascending Prussia.

But those ideas have found too much root in the sentiments of the German nation to be lost even if in Hamburg, as it well may be, the old traditions shall once more prevail. It was, indeed, only in connection with the Hamburg project that I wanted to see an American college in the Harvard way in immediate contact with the upper parts of the university. But I used from the first many an opportunity to urge that, just as in America, the college itself be added to the national system as a free and independent institution. Hamburg would need a real Harvard, but I know many a lovely town in my Fatherland where an

Amherst or a Lafayette would be a blessing for the true progress of the nation, and I never forget to add with enthusiastic heart that a Bryn Mawr and a Wellesley and a Vassar must follow. I know the time for all that will come, and if not to-morrow, the day after to-morrow will bring it surely. And from Germany it will spread all over the European continent.

That will be at last a gift of the New World to the Old, which will return the stimulation and impulse that the United States received from Germany. The German influence gave to America the method of research, the Ph.D. work, the graduate school. America will now give to Germany in return the college with its broadening influence and with its democratic spirit, which imparts culture to all alike, within and without the scholarly professions. We hear so much, and sometimes perhaps too much, of the exchange of professors between the United States and Germany. Such exchange of persons may be well. It has gone on, after all, for decades, as German scholars have come to this country in a steady flow, and American scholars have always visited German universities. But more important than the exchange of men is the exchange of institutions. The German graduate school, once imported here, has had an influence which can be felt in every corner of the intellectual life of America. And thus, I trust that the American college, once imported to Europe, will never cease in its beneficial influence for the culture of the non-professional men and women. In this sense I feel that I can add in my congratulations, brought to one of the most successful colleges of the country, a new dignity to the many claims of the American college. Each true college has been, and will be in the future, not only the stimulating benefactor of its students, not only the helpful comrade of the other colleges of the land, but, at the same time, an inspiring guide for the collegeless countries of Europe. May Lafayette flourish and grow in that threefold renown through the last quarter of its first century and for many generations of happy students thereafter.

Hugo Münsterberg
Harvard University

THE AMERICAN COLLEGE[1]

When Lafayette College opened its doors seventy-five years ago, Harvard College had ten professors and two hundred and sixteen students; Columbia College, six professors and one hundred and twenty-five students. Harvard was then one hundred and ninety-six years old, Columbia sixty-eight years old. To-day Lafayette has twenty-three professors and four hundred and eleven students. Should Lafayette grow as Harvard and Columbia have grown, then when our grandchildren and great-grandchildren gather to celebrate the hundred and fiftieth anniversary, they would find here five hundred professors and ten thousand students. The alumni would be invited to contribute toward an additional endowment of twenty million dollars.

The days to be, even more than the times of the past, are for us a book with seven seals. None knows what things lie on the knees of the gods; it is more than we can do to re-collect what has been strewn from their hands. But we at least believe that the American college was an important factor in the higher life of our country during the nineteenth century, and that the part of Lafayette, in the days of its adversity and in the days of its prosperity, has been no mean one.

The citizens of Easton who met at

[1] Address at the celebration of the seventy-fifth anniversary of the founding of Lafayette College.

White's Hotel on December 27, 1824, and resolved to establish an institution of learning in their beautiful village had foresight and courage. They were men of patriotism, naming the institution Lafayette College in recognition of "the signal service of General Lafayette in the great cause of freedom," and resolving that military engineering and tactics should be taught, because, as they said, "a freeman's arm can best defend a freeman's home." In the annual report of the trustees following the death of Lafayette, they said:

> We record an event unparalleled in the annals of the world's history, of one man's death arraying in the habiliments of mourning, all the friends of freedom on the globe. . . . Let ours be the sacred duty of imitating his illustrious example and holding it up for admiration to the wondering gaze of the dear youth of this institution, which bears his venerable name.

There were difficulties to overcome, but in 1832 George Junkin, a true leader of men, was elected president and three professors were called. Two of them were in mathematics and the sciences, one of whom, Samuel P. Gross, became a great surgeon of the last century. The traditional curriculum of Latin, Greek and mathematics was, however, adopted, and in its simplest form. The first half-year was devoted to the first book of Euclid; the third half-year to the fourth, fifth and sixth books. More than a year was given to Horace. There is in retrospect a curious incongruity between the gentle epicureanism of the Odes, and the lives of these young men, who had morning prayers at five o'clock and drank coffee for breakfast because milk was too expensive.

At the instance of President Junkin manual labor was substituted for military training. The early reports lay stress on the importance of the movement—how it assured the health of the students, gave them honorable independence and broke down class distinctions and class jealousies. The plan failed; to the misfortune of the college it may be. The existence of an agricultural department and of a mechanical department then and there is not without interest for the history of our educational system.

Another plan that failed was the course for teachers established at the beginning and seven years before the first normal schools of Massachusetts. In their second annual report the trustees wrote:

> As to elevating the standard of common school instruction, we propose to effect it by training teachers to that business as a profession. . . . Incompetent teachers very frequently receive inadequate support; and the inadequacy of the support secures and perpetuates the incompetency of the teachers. . . . Let teachers be well educated, that is, let them be taught thoroughly the branches which they will be called upon to teach, and, which is the principal thing, the art of *communicating* instruction and *governing* a school; and let their services be secured permanently in that business, by adequate pay.

In still another direction the founders of Lafayette notably anticipated educational development, namely, in advocating the study of English and modern languages. By the terms of the charter—one of its two definite provisions—a professorship of German was to be established. In their original memorial to the legislature, the founders said that it is to be regretted that students commonly limit their attention to the dead languages. They pointed to the ease with which the romance languages can be acquired after Latin, and said that German and Anglo-Saxon ought long since to have been made a part of education. They add:

> But the language most neglected in our seminaries of learning is the English. It is, we think, one of the follies of the learned to expend time and toil and money in minute investigation of the languages of other times and other people, at the expense of omitting the equally curious and more useful investigation of their own.

While these ideas do not seem to have affected the early curriculum, they are a prevision of the most important contribution made to education by Lafayette under the leadership of the great teacher, the great scholar and the great man, who just fifty years ago became professor of the English language and comparative philology, and introduced into our colleges the scientific study of English and Anglo-Saxon.

The Cambridge College, transplanted to the new Cambridge in 1636, and later to Virginia, Connecticut, New Jersey, Pennsylvania and New York, brought hither its organization and its curriculum; and these have been slowly and partially adapted to an industrial democracy. The curriculum and culture of the English College were esoteric. The church of the semi-reformation and the dead languages were in nominal control, but they touched lightly the young gentlemen destined to manage their feudal estates and to extend the British empire. The aristocratic English college of church and state with its classical curriculum was transplanted to scenes not excessively caricatured in Martin Chuzzlewit or by Mrs. Trollope, yet not alien to men such as Franklin or Jefferson, not lacking tendencies such as those expressed by Emerson or Whitman. The new colleges, following closely on the footsteps of the pioneers, were naïve, not crude; simple and narrow, but not philistine; lacking in perspective, but rich in ideals.

The American College has performed a great service. The statistics which show that college graduates are more likely than others to succeed in certain professions are not in themselves significant. One might as well argue for compressed feet, because Chinese women who follow the practise are more likely than others to marry mandarins. The ablest and most energetic men have gone to college, and the college has been the normal gateway to certain careers. It was, however, a gain to bring together many of the more promising young men and to give them such training and culture as might be. The college was the natural threshold to the church, to law and to medicine, so long as adequate professional schools were lacking. But when to these professional schools others in engineering, education, journalism and business have been added, it is not obvious how the old college of liberal arts will maintain its place. Technical studies should begin in the high school and liberal studies should be continued in the professional school. The college must adjust itself to these conditions.

Nothing in our educational history, indeed nothing in our whole civilization, is more hopeful than the increase of public high schools from 2,500 in 1890 to more than 8,000 to-day; of the students from 200,000 to more than 700,000. Nothing is more scandalous than the circumstance that seventy-five per cent. of the boys who enter the high school are driven away by its futility and feminization. The obsolescent culture of the college imposes itself on the high-school curriculum, even though of twelve boys who enter the high school only one proceeds to the college. The high school should and must primarily give training for the life work of the student, but with this should be united sympathetic appreciation of what is best in the past and present of the world, and the impulse to improve and create. We shall have 10,000 centers for training, culture and research, as soon as we produce educational leaders to man them. And the high school will educate its students so far as is possible without specialization beyond the

capacity of the community in which it is placed.

Students who complete the work of the high school at the age of eighteen can not to advantage spend the four subsequent years in a country club, where what time can be spared from athletics and social enjoyments may be given to studies that are irrelevant to their work in life. Such a system may be proper for a hereditary aristocracy of wealth, but it no longer obtains even in Great Britain. The newer universities are primarily professional schools, and Oxford and Cambridge are continually moving in this direction. The colleges of Oxford and Cambridge have on the whole maintained high standards of thinking and living, and many leaders have gone forth from their gates. But Oxford and Cambridge are great universities, not as the result of their curriculum or their monastic life, but because the English are a great race. Besides it is not now the "poll" course, but the highly specialized honor courses which attract the best men. We may hope that our educational system will ultimately set standards for other nations, but we must first learn from the experience of England, France and Germany.

Nearly all our colleges have been founded and fostered by religious denominations. Our common schools have been supported by taxation, and sectarian influences have been carefully excluded, whereas our institutions of higher learning have been dependent on private charity for which denominational zeal appears to have been requisite. Another circumstance accounting for this somewhat anomalous condition is the fact that the colleges were largely training-schools for the gospel ministry, the only profession that usually required an academic course. Of the first 277 alumni of Lafayette 112 became clergymen.

Lafayette was established under Presbyterian influences, but by the act of incorporation the college was strictly undenominational, and the governor of the state was empowered to appoint visitors, whose reports should be laid before the legislature. In 1833 the legislature made an appropriation of $4,000, and $2,000 a year for four years. Financial need rather than religious devotion led Lafayette to place itself under the care of the synod of Philadelphia in 1854. But it is not certain that this step led to increased support. The entire income of the college in 1862 was $3,240. When in 1866 an urgent appeal was made by the synod to the churches for funds to erect a chapel, the sum of $360.21 was collected. In the same year Lehigh University—whose funds now amount to two and a half million dollars—was established. It was at this time that the states west of Pennsylvania were awakening to the need of supporting higher education, and it was in 1862 that the federal government established the land-grant colleges of agricultural and mechanic arts, which now have an income from the nation and the states of ten million dollars.

If the resources of Lafayette and Lehigh could have been united, and if the state of Pennsylvania had learned the wisdom of doing for higher education what the central and western states have done, we might have had here one of the great universities of the world. Nor need religious or even denominational training have been neglected, for each sect might have established and supported its own college. It is not necessary that each of the thirty-four colleges of Pennsylvania should become a great university, but seven million people could well afford to devote annually a million dollars to each of seven universities, placed say at

Philadelphia, Pittsburg, Easton, Harrisburg, Williamsport, Johnstown and Erie.

A school or a college is self-supporting in the sense that the individual profits more than his education costs; a university is self-supporting in this sense and in addition it is economically the most profitable investment that a people can make. A million dollars spent on the highest education and on research add more than a million dollars to the actual wealth of the country. And if this research is not supported by public funds, it will not be undertaken, for its main benefit is not to the individual, but to the whole people. In a way we are consuming the capital of our country—the natural fertility of the soil, the forests, the coal and iron. Coal is mined in Pennsylvania to the annual value of $200,000,000. We are indeed thriftless if the value of the coal is not reinvested, on the one hand, in foundries, railways, and other material and ephemeral uses, and, on the other hand, in education and research, which are the most permanent of all investments. There are but few fathers who will leave their children less educated than themselves, and research and discovery are endowment policies whose dividends never cease.

But while we need great universities, we need equally high schools, colleges and technical schools. Mere size is entirely unimportant. If the spirit of scholarship and research can be maintained in small institutions, several of them may be more useful than one amorphous university. There is a certain psychological limit of size, beyond which organization becomes increasingly difficult. Perhaps twenty-five professors and three hundred students may be taken as the maximum of efficiency. The faculty in such an institution forms a homogeneous body competent to guide the policy of the institution and to select their successors. Each professor is responsible for the whole and to the whole. He can be the friend of the students whom he teaches, and each student is an integral part of the institution.

Such a college should have buildings and grounds of the value of about a million dollars and an income of at least $100,000. The parks, libraries, museums, art galleries, theaters and lecture halls are not for the professors and students only, but for the whole community. The work of the professors and instructors is not only the teaching of the students, but perhaps half of it, more or less, in accord with the ability and interests of the individual, should be for the advancement and diffusion of knowledge, for leadership in all that concerns the higher life of the community.

A college of this character can not cover equally the whole field of knowledge; it should be eminent in some direction. This might be civil engineering. In this case the best possible training would be given to professional engineers, not only expert knowledge and facility in their trade, but broad culture and the impulse to investigate, the tendency to treat conventions lightly, the power to break new paths and advance along them. Students frequenting this college might use civil engineering as a basis for law, medicine, architecture, business or any work in life, a new combination of interests leading to new advances and new professions. Or a college might be eminent in the teaching and investigation of the English language, as Lafayette has been, and this would be the center of its work and its influence. There would be half a dozen great investigators and teachers cooperating in all movements to maintain and improve our language, its grammar and dictionaries, the methods of spelling and printing, studying and making accessible to study its origins, its classics and its contemporary tendencies. Young investigators would gather here, and the students from the start would base their

training, their culture and their research on mastery of the English language, it being the basis in after life for work in literature, scholarship, journalism, teaching, the church, or any other profession whatever.

Lafayette is both a school of technology and a college of liberal arts. It has this year 225 students of engineering and 176 students in the arts courses. The future of the work in engineering appears to be more definite and assured than the classical and general courses, due not to any deficiencies in these courses, but to the general tendencies of our civilization. Lafayette may become a great university; it now ranks midway among the hundred leading institutions of the country, and we need at least so many universities. Its situation, as well as its history, gives promise to which no limit need be set. But a man can not by taking thought add one cubit unto his stature, nor would it necessarily be desirable to do so if he could. Loyalty to Lafayette depends on what it was and is, not on what it is not. And it is one of the glories of the American college that it so completely conquers the affection of its students and alumni. Like Job, a man may find new flocks and a new wife and new children; but he can not choose a new college. The associations and memories of the unreturning past are awakened as we come to these festivals—whether as prodigal sons or as wise men bringing gifts—and the renewed piety enables each of us to go back to bear with better courage his share of the Atlantean load.

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SCIENTIFIC BOOKS

H. M. BERNARD'S WORK ON THE PORITID CORALS

Catalogue of the Madreporarian Corals in the British Museum (Natural History). Volume VI. The Family Poritidæ. II. The Genus Porites. Part II. Porites of the Atlantic and West Indies, with the European Fossil Forms. The Genus Goniopora, a Supplement to Vol. IV. By HENRY M. BERNARD, M.A. London, 1906.

This is the third and concluding volume by Mr. Bernard on the Poritidæ. Volume IV. of the British Museum Catalogue of the Madreporaria treats the genus *Goniopora;* Vol. V. contains the *Porites* of the Indo-Pacific region, and the one under review gives an account of the *Porites* of the Atlantic and West Indies, with the European fossil forms, and a supplement to the genus *Goniopora.* These volumes represent an enormous amount of work, Vol. IV. containing pp. viii + 206, pls. xiv; Vol. V., pp. vi + 303, pls. xxxv; Vol. VI., pp. vi + 173, pls. xvii, making a total of 699 pages and 66 plates on this one family.

Two phases of Mr. Bernard's work deserve especial consideration: (1) His contributions to the morphology of the hard parts of the Poritidæ, (2) his peculiar method of arranging and designating the various forms or variations of the corals that he has studied.

Contributions to the Morphology of the Hard Parts.—Mr. Bernard was the first to point out that the septa are bilaterally arranged in the genus *Goniopora.* There are in each calice two solitary directive septa, opposite each other, one at each end of the calice. These belong to the primary cycle; the other four primaries are fused to secondaries; the tertiaries are shorter and fuse to the sides of the secondaries.[1] The pali occur on the inner ends of the secondaries or at the points of fusion of the primaries and secondaries. *Porites* is supposed to be derived from *Goniopora* by the disappearance of the tertiary septa. The growth form is elaborately discussed. It is stated,

> So far as growth form is concerned Goniopora (and Porites) may be regarded as astreiform perforates.
>
> Starting from what we have described as the primitive form of colony, viz., the circular slightly convex astræiform stock which would result from the normal budding of the primitive parent calicle,

[1] "The Genus Goniopora," p. 21.

we find two clear lines of departure from this form:

(*a*) They have become less convex, and growth has gone on round the edges, and the colony has become explanate.

(*b*) They have become more convex, and the colonies have become hemispherical and columnar.[3]

Each of these types of growth undergoes further modifications. Under (*a*) two secondary modifications are recognized, one in which small areas by stimulation into rapid budding form irregular columns, that can immediately readopt the explanate method of growth if they come into contact with any body that they can incrust; the other, the edges may run out into lobes, which by curling around form knobs or cylinders, that are left behind on the surface by further growth of the edge. Five variations of the massive growth-form are recognized, the principal ones of which are designated, pulvinate, expanding sheaf formation, and branching. The remarks on growth-form apply to both *Goniopora* and *Porites*.

In Volume VI. the interesting observation is recorded, that metameric growth is usual in poritid corals, *i. e.*, the first distinctive growth form repeats itself in the later development of the corallum.

Porites differs from *Goniopora* chiefly by lacking the third cycle of septa. The calices of the genus are bilaterally symmetrical; at each end of the plane of symmetry is a directive septum; one directive, the dorsal, being solitary, not taking part in the formation of a septal group, while the opposite one, the ventral, may be free or have a secondary fused to each of its sides; this directive and the two adjacent secondaries are designated the "triplet."

On each side of the plane of symmetry are two lateral pairs of septa; each pair is composed of a primary and a secondary septum fused by their inner ends. The details of the arrangement of the pali have been worked out with care. These structures occur, when the formula is complete, before each lateral pair, at the points of the septal fusion, on the solitary directive and on each member of the triplet, *i. e.*, there are eight pali. The variations of the palar scheme are numerous. The members of the triplet may fuse together by their inner ends, then a single palus, developed at the point of fusion, stands before the group, reducing the number of pali to six. The pali may be absent from the laterals of the triplet, when they are free from the directive, or they may be present on the laterals but none on the directive; there may or may not be one on the dorsal directive. Those before the lateral pairs are the most persistent, but in deep calices all pali may be obsolete. The elucidation of the various types of palar formulæ is one of Bernard's most important contributions.

Bernard's account of the structure of the septa and wall will next be discussed. He considers that the septum of *Porites* is composed of upright trabeculæ, joined together by radial horizontal bars and by tangential bars, the latter known as synapticula. In the ideal calice, there is the vertical columellar tubercle; outside it, each septum is composed of three trabeculæ, which, named in order from the center outward, are the palar, the septal and the mural. These trabeculæ by projection on the septal margin produce respectively the pali, the septal granules and the mural ridge. When the calices are crowded, the mural trabeculæ of adjacent calices may alternate in position with each other and produce zigzag walls. In the ideal calice there is only one septal trabecula, and consequently only one septal granule between the palus and the wall for each septum. Sometimes, however, there appear to be two granules, corresponding to two trabeculæ, between each palus and the apparent wall, the outer trabeculæ being joined by a synapticular ring. Bernard here considers that there is only one septal trabecula, the one next the palus, and that the next outer trabecula is in reality the wall trabecula; the third trabecula outward from the palus is homologically to be regarded as costal. These homologies of Bernard are based upon the assumption that the trabeculæ of *Porites* are parallel in their courses, and in general perpendicular to the outer surface of the corallum, an assumption with which the reviewer

[3] "The Genus Goniopora," p. 23.

does not agree. The number of granules on the septal margins of many *Porites* is variable, varying, however, within narrow limits, from one to two, or at most three or four. Specimens broken so as to permit the study of septal faces through considerable distances, several centimeters, show that the wall trabecula is persistently vertical and continuous, and the columellar trabecula is often definitely persistent throughout the length of the corallite. The intermediate trabeculæ, however, are not always vertical, but often incline inwardly, new trabeculæ arising in the angle between the outermost septal trabeculæ and the mural trabeculæ of a given calice. The innermost of these trabeculæ form the pali, those outside the palar ring form the septal granules, which sometimes vary in number for the same calice. Typical *Porites* has septa entirely homologous with those of the other *Madreporaria* in which the line of trabecular divergence is coincident in position with the wall, but in which the outer portion of the septum is suppressed.[3] Although the reviewer does not agree with Bernard in his conclusions on the morphology of the *Porites* septum, it should be emphasized that he was the first one to call attention to the importance of studying the granules on the septal margins and the details of the walls in the genus.

Synaræa Verrill is referred to the synonymy of *Porites;* the cœnenchyma of the former is regarded as formed by fused costal prolongation of the septa.

An hypothesis, proposed to explain the relationship of tabulæ to gemmation, may be briefly expressed as follows: a corallite divided into sections by transverse tabulæ was not occupied by a single individual, but by a succession of individuals. Each segment, bounded above and below by a tabula, was occupied by an individual which had originated by gemmation from the individual that occupied the immediately preceding segment. The strobilation of *Aurelia* and the peculiar budding of such forms as *Ptychophyllum* (the name of this genus is not mentioned) are cited to sustain the hypothesis. The discussion is continued with the remarks:

> If this is a true account of the phenomenon, that the earlier cruder form of metamerism with its piles of obviously discrete calices, passes gradually into a continuous skeleton, the original segments of which are now so disguised as to be seen only in the succession of the tabulæ, we shall have, in the formation of every such coral, to distinguish *two methods of growth.* In the earliest stages of its individual development the growth will be normal growth *de novo* from the larva, with the gradual withdrawal of the expanding polyp from the cup which is progressively too small for it. This results in the deposition of *one* series of tabulæ. When the normal size of the adult is reached the growth is different, and can no longer be described as a growth of the individual with withdrawal of the enlarging polyp from too small a skeleton, but the deposition of a new skeleton upon the framework of the old, the new skeleton belonging to a new individual polyp which comes into existence in some way by gemmation from the old, but the only visible sign is still seen in *another* series of tabulæ, differing from the first in that there is now no increase in the diameter of the stock.

Calicinal budding and the rejuvenation in both solitary and compound corals are well-known phenomena. The presence of tabulæ and dissepiments (tabulæ are only horizontal dissepiments) in a corallite in which the septa and walls are definitely continuous, is explained by the polyp's needing a new basal support after the septal and mural margins have been built to a certain height, therefore the polyp draws upward and forms a new bottom to the calice. To hypothecate successive budding to explain the occurrence of tabulæ and dissepiments in coralla of the type indicated is unnecessary.

Bernard's opinion on the phylogeny of the Poritidæ may be introduced here: they are considered to have a common ancestry with the Madreporidæ and Eupsammidæ.

Bernard's Method of Arranging and Designating his Specimens.—The extreme difficulty of recognizing and defining species of the Madreporaria is known to practically every one who has given serious attention to the

[3] This subject is more specifically discussed in the reviewer's "Madreporaria of the Hawaiian Islands and Laysan." Bulletin 59, U. S. National Museum, pp. 169, 170, 1907.

group; some even doubt whether it can be divided into species as are the mammals, birds, mollusks, etc. The solitary Madreporaria are probably not very much more difficult to study than other lowly organisms that secrete exoskeletons; but it is different with the compound forms. The difficulty in the way of making adequate studies is increased by the usual insufficiency of material, which has almost never been collected in such a way as to furnish data on the physical environment under which it lived, and the entire absence of any information obtained through experiment. In working over collections as they are usually submitted for determination and report, one is often entirely at a loss whether to refer certain specimens to previously described species, or to consider them new. As the specimens may not exactly fit any hitherto characterized species, there is, naturally, hesitancy to apply an already established name; should they be described as new, subsequent collections may render the name applied invalid. As matters now stand, we know a large number of characters of the Madreporaria, but we often do not know the taxonomic values of these characters. Bernard in order to escape from the species dilemma, proposed to give the various forms recognized by him geographic designations: the collection from each area is divided into as many forms as possible; each one of these forms is given the genus name, followed by the name of the geographic area from which it comes; this in turn is followed by two numbers; the first, in parentheses, indicates the number of forms known from the area; the second, which particular form of the series is meant. To illustrate the method, in Volume V. of the "Catalogue" six kinds of *Goniopora* are recorded from northwest Australia; these are designated *Goniopora* Northwest Australia (6) 1, (6) 2, (6) 3, (6) 4, (6) 5 and (6) 6. Each form is described in detail, and when possible, figures are given. No attempt is made to determine the systematic value of the forms; that is left to future work. This method can be commended, as it furnishes a certain number of detailed descriptions and figures and accurate geographic data to subsequent students, and thus will aid them in unraveling problems of coral systematics.

In looking over Bernard's work, it appears that he has not by the careful study of the variation of different characters in the same specimen, nor has he by carefully comparing the variation of characters in different specimens, attempted to discover the systematic importance of the structural features described by him. As the whole problem of systematic zoology can be resolved into the ascertaining of the relative values of the characters possessed by the organisms under investigation, the reviewer feels that more in the line of determining these values was to have been expected of Bernard's work.

In the opinion of the reviewer, Bernard in his last volume carries his geographic idea entirely too far. He says:

> It is in keeping with the conclusion at which our work has brought us: that while free-living organisms with highly developed powers of locomotion, such as fish or birds, may spread over the surface of the globe, and thus be largely independent of locality, this is not the case with sessile forms as highly developed as the corals. Whatever the "species" of corals may be, we know nothing about them, and can know nothing about them until we study them by means of experimental cultivation. We only know the local forms. Hence local forms are the only available units with which we can do solid work. We have to study them with a view to arranging them into larger groups extending over larger areas. * * *
>
> It now seems probable that the forms of the Indo-Pacific region will ultimately have to be divided into smaller groups corresponding to definite areas: for instance the Red Sea forms will be found to have characters peculiarly their own. A dim perception of this was pointed out by the author—but, as he now thinks, quite misunderstood—with regard to the genus *Turbinaria* (see Vol. II., 1896, p. 18, last paragraph). If this can be established generally, a great reform in the classification of corals can not be long delayed. All purely imaginary groups such as species or morphological "forms" of indefinite distribution will be abandoned as units, and the corals will have to be treated as we treat races of men—*as factors in the areas which they inhabit*, and upon the conditions of which they largely depend for their peculiarities.

Before criticizing the preceding quotation, it is desired to call attention to Bernard's geographic subdivision of the *Porites* of the western Atlantic, the Gulf of Mexico and the Caribbean Sea. They are Brazil, Curaçao, Trinidad, Barbados, Guadalupe, Antigua, Barbuda, Nevis Island, St. Christopher, St. Bartholomew, Anguilla, Santa Cruz, St. Thomas, Porto Rico, Santo Domingo, Jamaica, Belize, Vera Cruz, Florida, Bahamas, Bermuda: 21 different areas are recognized.

One would infer from the first sentence of the remarks just quoted that the free-swimming larval stage of the Madreporaria has been overlooked. Duerden's "West Indian Madreporarian Polyps" was examined to see if he gives any definite information on the duration of this stage in the corals that he studied. The data given by him are indefinite, but the larvæ of some species may be free for several days at least, and it is possible that those of *Siderastrea radians* may live in that state for several weeks. Over extensive areas where coral reefs occur, the three conditions favorable to the wide distribution of shallow-water coral species are realized; these conditions are: (1) Either shoal water or intermittent shoals; (2) oceanic currents; (3) larvæ that can live unattached for at least moderate, and possibly considerable, periods of time. There is every *à priori* reason for the relatively extensive distribution of coral species; and it will be impossible to convince many who have had wide experience with these organisms, that their species do not often have such distributions. A few instances of wide distributions are *Fungia fungites* (L.), from the East Coast of Africa to the Philippines; *Fungia paumotensis* Stutchb., the Philippines and Papeeti, Tahiti; *Fungia patella* (Ell. & Sol.), East Africa and the Hawaiian Islands; *Mœandra* (*Diploria*) *labyrinthiformis* (L.), Bermudas, Bahamas, Belize (British Honduras), Curaçao; and there are many other similar instances. As a further illustration, the results recently obtained by the reviewer from a study of *Orbicella annularis* (Ell. & Sol.) and its variations may be cited. The typical form of this species was determined by comparison with photographs of the type, kindly furnished by Professor J. Graham Kerr, of the University of Glasgow. The typical form, used in the most restricted sense possible, of this species is represented in the United States National Museum by specimens from Hog Island, Bahamas, Dry Tortugas, Florida, and Belize, British Honduras. One of the variations from the typical form comes from Dry Tortugas and Hog Island. The variation from the typical form may be of vegetative origin, *i. e.*, induced by something peculiar in the environment under which the specimens lived, or they may be due to variations in the germ cells. We do not know which of these causes is responsible for the variation; but that *Orbicella annularis* occurs throughout the coral reef areas of the coasts of the Gulf of Mexico and the Caribbean Sea, including the Antilles, Florida and the Bahamas, is undeniable. The implied postulate of Mr. Bernard that similar forms may have different phylogenies demands stronger proof than his mere suggestion that such may have happened; for there is no more reason to doubt that in corals morphologic identity means specific identity than there is to doubt its meaning for other groups of organisms.

As isolation is one of the well-recognized factors in evolution, its influence in the Madreporaria is to be expected, and this expectation is realized. For instance, as the Isthmian region of America has been closed for some time, geologically speaking, divergence between the recent Atlantic and Pacific faunas of America is to be expected, and is a fact.

Mr. Bernard is right in insisting on the need for the experimental cultivation of Madreporaria in order to understand many problems pertaining to the group; but we have obtained a number of solid facts without such experimentation, and studies of variation and general ecological investigations are fully as necessary as experiments.

Ninety-six forms of *Porites* from the Atlantic Ocean, six fossil forms from Europe, and sixteen recent forms of unknown locality are described.

From a comparison of the Atlantic and

Pacific forms the conclusion is reached "that the trabecular, horizontal, and synapticular elements which compose the skeleton are thicker and coarser in the Atlantic and West Indian forms than they are in those of the Indo-Pacific."

After the descriptions are the following analytical tables:

Table I. Contains the Locality, the Depth or Geological Horizon, when given, references to published figures, the museums in which the type is preserved, and the page in this Catalogue where the detailed description will be found, for each form.

(With a supplementary Table of Porites from no recorded locality, some of which undoubtedly belong to the Indo-Pacific area; the list of known forms from that area is given in Vol. V., p. 248.)

Table II. Survey of the Geographical and Geological Distribution of the Atlantic, West Indian and European fossil representatives of the Genus, so far as at present known.

Table III. Analysis and Distribution of the Known Variations in Growth-form of the Porites of these same regions.

Table IV. Analysis and Distribution of the more easily definable Types of Calicle discoverable in the same.

In the supplement to *Goniopora* seventeen additional forms are described.

In concluding these remarks the reviewer wishes to state that he does not agree with Mr. Bernard's conclusions regarding the structure of the septa of *Porites,* and is opposed to the hypothesis of serial gemmation for each tabula in tabulate corals; he also considers that Mr. Bernard attributes too much importance to the geographic-number system for designating forms. The existence of the three factors favorable to the wide distribution of shallow water species of corals seems not to have been considered; these factors are: (1) Shoal water or intermittent shoals over extensive areas; (2) oceanic currents; (3) free-swimming larvæ. The reviewer, while recognizing the importance of isolation in causing divergence between coral faunas of separated areas, insists that some species of corals have wide geographic distribution and that there is no more reason for doubting that morphological identity in corals means specific identity than there is for similar doubt in any other group of organisms.

Mr. Bernard discovered the principles underlying the septal arrangement for *Goniopora* and *Porites* and worked out the various palar formulæ for the latter genus; he has shown students of Madreporaria the importance of studying in much greater detail the calicular structure of these corals; he has pointed out important calicular features that had previously received little or no attention; and his work on the growth forms of coralla is of importance. These are what the reviewer considers Mr. Bernard's solid contributions to the morphology of the poritid skeleton. The descriptive work of the catalogues is of value, for many forms are described in detail, excellent figures of a number of them are given, and they are referred to definite localities. No attempt was made to define species and to determine their distribution, as the data for such an undertaking were considered insufficient. However, when his contributions to the morphology of the skeleton are taken in connection with his descriptive work, Mr. Bernard deserves congratulations on having done much that will ultimately aid us in understanding the systematics of these perplexing corals.

T. Wayland Vaughan

DISCUSSION AND CORRESPONDENCE

THE FIRST SPECIES RULE: AN OBJECTION

To the Editor of Science: Pray allow me to range myself with Dr. Bather in entering a caveat against the first species rule, at any rate for paleontology. It is demonstrable that such a rule fails to interpret the views of authors. It can be tested. There are authors who have stated or obviously indicated their genotypes; there are those who have not—in fact, the same author may come in both categories. Now if the former are always found to have placed their genotypes first then is the first species rule first for the latter; but if not, then it fails.

Authors have adopted at least four methods of arranging their species: (1) the technical, as I will call it; (2) the biological; (3) the stratigraphical, as Dr. Bather points out; (4) the alphabetical.

By the technical I mean that the author describes the genotype first, and then places his other species in sequence according to their degree of difference from it. This is the only plan to which a first species rule applies justly; but this plan, though it may be common in neontology, is certainly rare in paleontology, where any of the other three methods are more usual.

The biological system consists in arranging species according to their supposed genetic sequence; but the middle or last species may be the genotype as often as the first. The biological plan may be stratigraphical in result; but not in intention. This biological method was used by Hyatt. For instance in his genus *Tropidoceras,* to name one case among many, he placed three species (*Bull. Mus. Comp. Zool.,* 5, 1867, p. 93). It can be seen from the method of his later works that he regarded these species as forming an anagenetic series, of which the first two were the immature, larval forms while the last was the mature, fully developed type of the genus; it conforms the best with his diagnosis. This, therefore, is the one to take as his genotype; a first species rule would do him injustice.

In my genera (Mon. I. O. Amm., Suppl.) the species are arranged on Hyatt's plan—in supposed genetic sequence. My genotypes are stated; but had they not been, the first species rule would fail to interpret me correctly; my genotypes come frequently in the middle of the series—preceded by species biologically less, succeeded by species biologically more, developed.

The stratigraphical method was one much favored by the older paleontologists. In such a work as d'Orbigny's "Prod. Pal." the whole arrangement is stratigraphical; that governs the first mention. Opening at random, I find *Cryptoceras* d'Orbigny first species mentioned *C. subtuberculatus* of the Devonian; but it is obvious that he regarded as the genotype *C. dorsalis* of the Carboniferous.

In other works species may be arranged by zones or beds, beginning with the earliest; the first species need not be the author's type.

Of the alphabetical method an instance may be seen in M'Coys "Carb. Foss. Ireland." His first species of *Brachythyris* is *B. duplicicosta.* Dall in his most useful work, "Index Names Brach.," records this species; and the inference is that he regards it as the type. But M'Coy had depicted without final name a form of *Brachythyrus* a few pages earlier; this is obviously his type and it is *B. oralis* which comes sixth. In *Martinia* the first species is *M. decora,* as Dall records; but M'Coy had figured an example in the same way, which is clearly a form he united under *M. glabra;* that comes third. Then M'Coy had given a further indication that he regarded *M. glaber* as his type—by using *Martinia,* for *glaber* is Martin's species.

Then there are cases in which the author indicates his type by making the generic name resemble a trivial one. Thus the obvious type of *Reticularia* M'Coy is *R. reticulata;* of *Fusella* M'Coy, *S. fusiformis;* of *Ornithella,* Deslongchamps, *T. ornithocephala.*

Since in these various cases where the genotype has been stated or obviously indicated the first species rule is demonstrably unjust, it follows that in other cases it is quite as likely to be wrong. A rule which presumes to interpret correctly in unknown cases must surely be able to show that it does justice in known cases. Tested by these the first species rule breaks down.

S. S. BUCKMAN

THAME, ENGLAND,
August 2, 1907

HOLOTHURIAN NAMES

DR. THEO. GILL, in the August 7 issue of this journal (p. 185) rightly takes exception to the use of *Holothuria* for a genus of echinoderms. In my paper on "The Holothurians of the Hawaiian Islands" I used the name in the sense that Théel, Lampert, Ludwig and every other writer in recent years has employed the term, and I did not, as Dr. Gill

surmised, take the trouble to look up the original reference (Linnæus, "Syst. Nat.," 10th ed., I., p. 657). Having *had* confidence in the above authorities I copied their blunder, with the best intentions. So much for my error.

I shall adopt (but not "with pleasure") Jäger's name *Bohadschia*. I have for some time been aware that *Microthele* probably has precedence over *Actinopyga* Bronn (for the genus erroneously called *Mülleria*), but I hesitate to accept it until the identity of Brandt's species is settled beyond peradventure.

Apropos the passing of *Holothuria*, for the old and well-known genus of sea-cucumbers, an amusing yet serious situation presents itself. Naturally, if, as Dr. Gill points out, *Holothuria* is really a Portugese man-of-war, we can no longer speak of sea-cucumbers as "holothurians," nor of the class as *Holothurioidea*. The word "holothurian" has been, in its limited field, as useful as the more familiar "mammal." And which of the several synonyms should succeed *Holothurioidea*?

W. K. Fisher

Stanford University, Cal.

SPECIAL ARTICLES

THE OCCURRENCE OF MIDDLE TERTIARY MAMMAL-BEARING BEDS IN NORTHWESTERN NEVADA

In the summer of 1905 the writer received from Mr. Robert L. Fulton, of Alameda, California, several fragmentary bones and teeth of Miocene mammals, said to have been obtained at Virgin Valley, in northwestern Nevada. Subsequently arrangements were made to visit the locality in company with Professor John A. Reid, of the University of Nevada. Professor Reid very kindly made inquiry as to the location of the beds, but was himself unable to visit the region. In June, 1906, the writer in company with Mr. Felix T. Smith, of the University of California, visited Virgin Valley for the purpose of making a preliminary examination of the field. In reaching the valley we were kindly assisted by the employees of the Miller & Lux Company, and in locating the most fossiliferous exposures we were much indebted to Mr. T. H. McGhee, whose son, Mr. Edward McGhee, was the first person known to have discovered fossil bones in that region.

Virgin Valley is situated in northwestern Nevada, about 15 miles south of the Oregon line and 40 miles from the California line. Virgin Creek, which drains the valley, is a tributary of Thousand Creek, emptying into Thousand Lake, close to the northern border of Nevada. The region about Virgin Valley is semi-arid and is practically treeless. Though no extensive search has been made through the literature, I am not aware that this region has ever been visited by any geological party. A number of explorers have evidently passed near it to the north and to the south.

The valley of Virgin Creek is a basin with a north and south trend, the fossil beds being situated in a trough formed by an older series. The older formation consists largely of tuffs, ashes, and rhyolitic lavas. Superficially it resembles a part of the Clarno Eocene series of the John Day region to the north. On the east side of the syncline, at Thousand Creek Hill, a fine section of these beds is exposed. Some of the tuffs in the upper part of the series are exceedingly coarse, and pieces of pumice in them are in many instances several inches in diameter. The lower portion of this series was not examined, but the materials seem to be finer toward the base of the section. Beds superficially similar to those on Thousand Creek Hill cut off the southern end of Virgin Valley on the other side of the syncline, beyond the Virgin Ranch. At this point they dip back toward the Thousand Creek Hill to the northeast.

The mammal-bearing Tertiary formation, which is here tentatively designated as the Virgin Valley beds, rests in the basin formed by the older tuffs. Where the lower portion of this formation rests upon the older beds it has been somewhat disturbed, but the amount of disturbance appears, at least in some cases, to be less than that shown by the older series. The inclination of the Virgin Valley beds on the eastern side of the syncline may be largely due to the development of an extensive fault

which forms Thousand Creek Hill, and presents a steep escarpment to the east.

The thickness of the Virgin Valley beds is evidently between one thousand and two thousand feet. The larger part of the formation is composed of volcanic ash or tuff showing a variable amount of induration. Characteristic bad land structure has been developed in many places. The formation may be divided somewhat arbitrarily into upper, middle and lower divisions. The lower beds are somewhat harder than the others, and where bad land structure occurs in them very steep faces are frequently produced. These beds show strong contrasts of coloration, varying from white to green or bright red. The middle beds are generally brownish or gray, and weather in gently rounded knolls. The upper beds are usually softer than the others and consist of cream-colored ash.

Mammal remains are quite common in portions of the upper beds, and at a horizon which is apparently in the lower division, though not in its lowest portion. Only a very few fragments of bones were found on the middle division, but plant remains are very abundant at this horizon. Large logs of beautifully petrified wood are present in abundance, and near the middle of this division stems and leaves have accumulated in sufficient quantity to form a thin lignitic deposit.

Judging from the character and occurrence of the fossil remains, large portions of the upper and lower divisions of the formation are of æolian origin, or have formed in shallow, shifting lakes comparable to existing lakes only a few feet in depth, such as are not uncommon in the eastern Oregon region at the present time. A part of the middle division, particularly that portion containing the lignitic deposit, has evidently formed in or about a body of water.

The mammalian remains obtained from the lower horizon include a type near *Chalicotherium* or *Moropus*, two types of horses, two or more cameloid types, a canid and a number of other forms. *Chalicotherium* is represented by a number of characteristic bones, including the peculiar phalangeal elements. Of the horses one is a form with short-crowned molar teeth resembling those of the Miocene *Hypohippus*. The other has short-hypsodont molars and is evidently in, or close to, the Miocene genus *Merychippus*. Of the camels one species is represented by limb bones indicating an animal of considerable size, and evidently of the *Procamelus* type. The canid is represented by a second lower molar apparently differing from any type thus far described from the Tertiaries of the Pacific Coast region.

The fauna of the upper beds includes a mastodon, a horse, two camels, a large cat and fragmentary remains probably representing a rhinoceros. The mastodon is a species of considerable size, and is evidently not older than the stage of the Mascall Miocene of the John Day region. One of the camels is represented by a metapodial about as large as that of *Alticamelus* of the lower Loup Fork. The cat is known only from a second phalanx indicating a large form with powerful extremities.

Such paleontological material as is present indicates that the upper division of the Virgin Valley beds is probably of Miocene age and not older than the stage of the Mascall Miocene of the John Day region. The fauna of the lower horizon, so far as known, is also evidently Miocene, though it may represent a slightly different phase.

The fauna of the Virgin Valley beds, particularly of the upper division, appears in a general way to represent the same period as the fauna of the ash and tuff formations in Nevada, which have commonly been recognized as corresponding to the Truckee Miocene. If such is actually the case, there will apparently be little reason for correlation of the Truckee with the John Day, as has commonly been done, since the Virgin Valley beds are near the age of the Mascall beds of Oregon, and the John Day is separated from the Mascall Miocene by the Columbia Lava formation, as also by a considerable unconformity below the Columbia Lava.

As far as I am aware, the beds of the Virgin Valley region offer more material

for the study of extinct mammalian faunas than has yet been discovered elsewhere in Nevada. Situated as they are between the typical localities of the Tertiary formations of eastern Oregon and the areas of Truckee Miocene in Nevada, they will probably be the key to the correlation of these formations. The examination of the beds made thus far has necessarily been exceedingly superficial, but it is hoped that the continuation of this work during the next season will put us in a position to make a satisfactory determination of the relative ages of the Oregon and Nevada Tertiary formations.

John C. Merriam
University of California

Physiographic Changes Bearing on the Faunal Relationships of the Russian and Sacramento Rivers, California

For some time biologists in this state have noted the close relationship between the fauna of the Russian River and that of the Sacramento, in forms that do not migrate through salt water. In a recent trip through Lake County very clear evidence was found that the waters of the Scott's Creek now flowing into Clear Lake and thence into the Sacramento, formerly flowed into the Russian River. Clear Lake is a sheet of water some twenty miles in length and lying at an elevation of about thirteen hundred feet in the middle of Lake County. Scott's Creek rises in the mountains to the westward and after flowing to within two miles of Clear Lake turns to the northwest, cutting a gorge through the mountains.

On going *down* this valley one is confronted by the startling physiographic fact that it bifurcates into two valleys without change of grade. Such a division is not unusual on the flat surface of a low-grade delta, but it challenges investigation when encountered in a mountain gorge with hills rising fully a thousand feet on both sides. The valley to the left has practically a level floor and is occupied by the narrow and rather deep Blue Lakes. Three miles from where it leaves Scott's Creek, without any narrowing it terminates abruptly against a transverse ridge about one hundred and sixty feet high. Beyond this ridge the valley is occupied by Cold Creek, which empties into the Russian River.

Returning to the point of bifurcation of Scott's Creek the gorge to the right turns eastward and empties into the northern end of Clear Lake.

Climbing the hills on either side of Blue Lakes the valley in which they lie is seen to be continuous in slope and outline with that of the upper portion of Scott's Creek and of Cold Creek except for the low transverse ridge already mentioned and which evidently is the dam that made Blue Lakes.

On examination this ridge is clearly a comparatively recent landslide. It has the characteristic hummocky, uneven surface and still shows two or three ponds not yet filled nor drained. The slide came from the southwest slope of the main valley and is approximately a mile in length, starting from an elevation of fifteen hundred feet (aneroid) above the Blue Lakes. The valley is here about an eighth of a mile in width, and the momentum of the slide carried it across the valley and somewhat up the opposite slope. At this point, which is crossed by the stage road to Ukiah, the contrast in color of soil of the slide and of the eastern valley slope is very marked.

When the slide occurred the waters of Scott's Creek were evidently backed up for some ten miles, forming a lake, narrow in the gorge and widening out in the more open valley above. The waters of this new lake rose until they overflowed a low divide separating a tributary from the head of a small tributary of Clear Lake. The outlet thus determined was lowered by erosion and is now the main channel of Scott's Creek. The base level for this channel was determined by Clear Lake and the lake in Scott's Valley was soon filled by sediment making a rich alluvial plain with a maximum width of two miles. In a well sunk in the center of this plain tules were found at a depth of about seventy feet below the present surface. The portion of the old channel below the tributary through which

the overflow took place did not fill with sediment as rapidly as the main valley and is now occupied by the Blue Lakes and Laurel Dell Lake—commonly termed, collectively, the Blue Lakes. The location of the low divide where the temporary lake overflowed is probably about one and a half miles from the Blue Lakes gorge. At this point the wagon road crosses a low spur that runs out to within four hundred feet of the opposite side of the valley, which is here undercut by the stream.

Remembering the recent settlement of California, it is needless to say that the time of the Blue Lakes slide is prehistoric. Indian legends tell of the sudden creation of the Blue Lakes, but they fix no date and are hardly acceptable in a physiographic court. The trees on the slide and on the adjacent slopes do not differ in apparent age, but the mountains are not heavily wooded in this vicinity. The filling in of Scott's Valley and the cutting of the divide separating the new lake from Clear Lake give some suggestion of the time. As the waters did not overflow the landslide which at its lowest point is about one hundred and sixty feet above Blue Lakes, the erosion of the new channel must have been to a less depth than the height of the slide.

Brief mention should be made of another connection between the waters of Russian River and the streams of San Francisco Bay. Copeland Creek flows down the western slope of Sonoma Mountain and debouches on a fan that spreads out over the flat divide separating the Russian River from the Bay. The southernmost of the distributaries on this fan empties into Petaluma Creek and thence to the bay. The northernmost flows into the Russian River. These distributaries meet today at the head of the fan and in flood time Copeland Creek discharges both ways. This connection seems less important than that of the Blue Lakes, for it connects the Russian River with a small stream emptying into the salt water of the bay. The Blue Lakes slide transferred bodily a portion of the fauna of Russian River directly to the Sacramento River system.

RULIFF S. HOLWAY

FOWLER'S TOAD (BUFO FOWLERI, PUTNAM)

WE are all familiar with toads—they seem common enough in our gardens and fields, yet few are aware of more than one common species in the eastern states. One toad has been strangely overlooked. Considered rare and local for many years, it is beginning to be recognized as one of the commonest forms, with a range from New England to the southern states. In fact the popular term "common toad," in much of this territory better applies to the toad (*Bufo Fowleri*), until very recently considered so rare and limited in its range, rather than to the older and better-known species (*Bufo Americanus*).

Concerning the range of Fowler's toad, Miss Dickerson in her excellent "Frog Book," reports it only from Danvers, Cutty Hunk Island, Mass., throughout Rhode Island, and New York near the coast. My own observations of this toad for a period of over ten years, lead me to believe it is a common toad that has been almost overlooked. It is heard in great numbers all along the Maanixit River, throughout the region from Oxford to Worcester, Mass., where I first became acquainted with the toad while doing some collecting in connection with nature-study work at Clark University. During the years 1900–05, I spent the greater portion of the spring and early summer at Chapel Hill, North Carolina, a small town about twenty-eight miles northwest of Raleigh. Here also I heard the unmistakable droning cries of these toads. In 1906 I took up quarters in Washington, D. C., and during the serene May nights I heard a great many of these toads in and around the Fish Ponds just west of the monument grounds. In fact these toads were hopping about throughout the vicinity—apparently the only species of toad to be met with frequently in Washington. Very recently, also, I learned from a competent observer that these toads were extremely abundant around Cumberland, Maryland. He stated that he had seen great numbers along streams in this region during the month of June, making the nights fairly hideous with their noise. In August, 1906, I met *Bufo*

Fowleri very frequently in Granby, Connecticut. In fact *Bufo Americanus* seems to be very uncommon in this region. It is at once evident that the range of Fowler's toad is rather extended, and while I am inclined to believe its southern limit is pretty nearly reached in central North Carolina, from the fact that I heard it only scatteringly there in the Chapel Hill region, I found it very abundant—segregated in numbers during the mating season, along the Maanixit River from Oxford to Worcester, Mass. There is no reason to believe it is confined to this valley alone, however, although here it is not at all uncommon.

Dr. Stejneger, of the Smithsonian Institution, recently informed me that Miss Dickerson in a recent visit to Washington identified Fowler's toad as being the common species here.

One has only to visit the Fish Ponds during the warm May nights, to hear numbers in chorus, and find them hopping about under the electric lights almost anywhere in the vicinity.

I feel that the range of this toad will be greatly extended with more careful observation. In my home region, Oxford, Mass., I think it is the commoner toad by far, and this conclusion is borne out by the relative numbers that express themselves in voice among the two species.

Bufo Americanus in this region seems to prefer the smaller pools, and is often heard in early April singing, singly or in small colonies. Its notes are among the sweetest of the springtime—mellow, musical trills, expressive of repose and serenity. On the other hand, I have heard *Bufo Fowleri* only along the Maanixit River, and along quiet-flowing streams around Worcester. In these localities in late June, the great chorus of Fowler's toads, indicates the height of their love season. Only on one or two occasions have I heard the notes of a common toad mingling with those of Fowler's toad at this season.

The congregations of the different species of frogs and toads in certain ponds and streams at the love season have always seemed rather remarkable to me. Certain ponds seem to have collected all of one species, while other near-by ponds and mud-holes never or very rarely yield a note of this same species at the song season. I can not recall having heard Fowler's toad in Grassy Pond, only a mile from Maanixit River—a pond with every condition one would judge favorable to this toad. During all the years I spent observing batrachians in this region, I found it necessary to go several miles to the river banks to hear these puzzling toads. It seems that they make rather extended journeys to certain favored streams at the egg-laying season.

I have heard nothing in nature so weird and unearthly as the almost agonized wail of this toad, repeated at short intervals. *Bufo Americanus* is heard as much during the warm spring days as at night; Fowler's toad is heard almost entirely during the earlier part of the night.

In size and coloration one can seemingly separate the two toads. *Bufo Fowleri* is a much more trim, dapper, active little fellow than its relative *Bufo Americanus*. It appears less roughened and warty, and decidedly more gray in general coloration than the latter. The latter toad is spotted beneath, while the under parts of *Bufo Fowleri* are uniform grayish, the throats of the males being dark. Whether or not these color distinctions are always thus defined in the two forms remains to be determined.

Until Miss Dickerson gave Fowler's toad specific rank, it was regarded as an extremely local race of *Bufo Americanus*. It is remarkable that the toad should have been ignored so long, and even in localities where it is the extremely common form. In the lateness of its mating season, and in its song, Fowler's toad is totally unlike the common toad (*B. Americanus*), although comparisons in the laboratory, of preserved specimens, do not at first sight show strikingly different specific characters. It would be very interesting to determine definitely the relation of this toad to *Bufo Americanus*, and the more southern form (*Bufo lentiginosus*).

H. A. Allard

Bureau of Plant Industry,
Washington, D. C.,
May 24, 1907

PRELIMINARY NOTE ON A NEW DISEASE OF THE CULTIVATED VETCH

ABOUT the middle of last July the senior author discovered a fungus disease of the cultivated vetch which does not seem to have been reported before. He first observed it on the stems and pods from a small patch of the vetch on the horticultural grounds of Cornell University. It was later brought into the laboratory from two fields of the cultivated vetch on the university farm. The disease appears to be quite abundant and is often associated with an *Ascochyta,* especially on the stems. Here the two fungi are often mixed together and it is thus possible for one not familiar with the new one to confuse its spores with those of the *Ascochyta.* On the pods it often occurs quite pure, and here it is easily seen with the unaided eye to be quite distinct from the disease caused by the *Ascochyta.* It is, however, frequently mixed even on the pods with the *Ascochyta,* but the spots are here so characteristic that there is no trouble in distinguishing it.

The gross appearance of the spots and spore pits on the pods is very striking. The spots are elongated, forming either long narrow or elliptical spots, sometimes with a dull purple border. The spots on the pods are oblique, probably due to the oblique fibrous structure of the pods. The middle line of the spot is white from the numerous spores formed on the basidia and which later ooze out in masses. When in mass the spores have a pale pink or flesh color, and a hasty preparation suggests the genus *Glæosporium.* When the spores are washed by the rains they give a whitish appearance to the entire spot because of the thinness of the layer.

The fruiting part of the fungus is beneath the epidermis, the latter being ruptured in the form of a slit through which the spores escape. The mycelium becomes brown and then black, and the epidermis is also blackened by the action of the fungus. In age then the spots are black oblique lines as seen on the pods, and many of them may be sterile through failure of the fungus to fruit.

The spots caused by the *Ascochyta* are nearly or quite circular, grayish in color, with a dull purple border, and the grayish center punctate with the minute brownish pycnidia.

Besides the interesting character of the spots the structure of the fungus causing this new disease of the vetch is even more interesting. In structure it resembles that of a species of *Corticium.* The basidia form a definite hymenium which arises from the pseudoparenchymatous subhymenium of angular cells, two to three cell layers in thickness. The nourishing mycelium extends out into the surrounding tissue of the host. The basidia bear four to eight spores, which are sessile and usually produced in a whorl or crown at the end. The spores are oblong to subelliptical, straight or curved, continuous, hyaline, granular, and measure 12–20 x 3–3.5 μ. As the spores fall away from the basidia others are probably produced (in culture they are). Conidia similar to the basidiospores are produced on slender conidiophores. These are intermingled with the basidia and this character recalls that of the genus *Exobasidium.* The spores also bud in yeast-like fashion from one or both ends, rarely from the side, and the sporidia thus produced are similar to the spores. In this way a great mass of spores is produced from the spore pit. The fungus occurs on the leaves and flower bracts also. It has been obtained in pure culture by several different methods of separation. It grows slowly, but ultimately produces numerous black stromatic bodies and numerous spores, which are pink in mass.

The fungus appears to be the type of a new genus for which the name *Protocoronospora* is proposed, and a provisional diagnosis is given as follows:

Protocoronospora Atkinson and Edgerton new genus.

Stroma pseudoparenchymatous, two to three cell layers in thickness, formed by the compact branching of the mycelium, the ultimate exterior branches producing the basidia which form a hymenium. Spores sessile, hyaline, colorless, continuous, smooth, several (usually four to eight) on a basidium. Spores budding and forming sporidia similar in form. Conidia also similar in form on slender short conidiophores intermingled with the basidia.

P. nigricans Atkinson and Edgerton n. sp.

Forming narrow elongated spots on the pods, stems, leaves and bracts, spots oblique on the pods and from 2–5 mm. x 1–2 mm. Spots at first white or with a purple border, later black. Stroma of pseudoparenchymatous cells 6–9 μ in diameter, two to three cell layers in thickness. Basidia clavate to subcylindrical, 20–30 x 6–8 μ, 4–8-spored. Spores sessile, and basidia continuing to form new spores, at least in artificial culture. Spores pale pink in mass, oblong to subelliptical, hyaline, continuous, smooth, granular, straight or curved, 12–20 x 3–3.5 μ, usually becoming once septate on germination. Mycelium from the stroma penetrating the adjacent tissues. Parasitic on pods, stems, leaves and bracts of *Vicia sativa*.

Geo. F. Atkinson,
C. W. Edgerton

Botanical Department,
Cornell University

MARINE BIOLOGICAL ASSOCIATION OF SAN DIEGO[1]

General Statement.—The La Jolla park transfer matter, the sewer bond election and the building of the new boat have been the events during the past year of foremost moment to the general association. The story of these is so well known that for the purpose of this report they can be quickly despatched.

The legislation requisite in the opinion of the attorney general of the state, to enable the city to transfer its trusteeship of the park at La Jolla to the board of regents of the University of California, was secured without a lisp of opposition, so far as we know, early in the last session of the state legislature. Shortly after the enabling act became law the city council passed an ordinance providing for the transfer, under certain conditions, of the title to the park to the regents of the university, the conditions of the transfer having been first submitted to and approved by the attorney of the board of regents to insure that the trust might be accepted legally and consistently with the university's rules and policies.

[1] Extracts from the annual report, presented July 20, 1907, by Wm. E. Ritter, scientific director.

Meanwhile, by reason of enlarging ideas and plans in the minds of the station's foremost supporters, Miss Ellen B. Scripps and Mr. E. W. Scripps, the inadequacy in size of the little park for the future developments contemplated, became more and more apparent. The final step in the transaction between the city and the board of regents was consequently deferred pending another effort to secure a site of more ample size somewhere in the immediate vicinity of La Jolla, which vicinity all expert judgment appealed to unites in declaring must not be given up under any circumstances. The only piece of ground even approaching the desired size, and at the same time available, was found to be a pueblo lot of about 160 acres owned by the city. It is a great satisfaction to be able to report that the efforts to secure this land have advanced to such a point as to justify the expectation that within a month the association will be the possessor of a station site large enough to admit of the developments looked forward to.

There remains in this connection only the pleasant duty of acknowledging the association's obligations to the various agencies that have contributed to securing for the association what it has asked. It is difficult to imagine how any community could take up a purely non-commercial project like this more intelligently and heartily, and promote it more liberally, than the San Diego community has this biological one. Individual citizens, business houses and corporations, city officials, representatives of the city and county in the state legislature—everybody, in short, with whom we have come into relations has treated us even better than we expected to be treated, and that is saying a good deal.

Planning for the New Laboratory.—The plan suggested at the last annual meeting, held in September, 1906, that the first section of the new laboratory building be hurried to readiness for dedication in early September, 1907, came to the end of many another fond hope. Unquestionably real good would have resulted to the station could the scheme have been carried out. But unquestionably also the conditions that have prevented its realiza-

tion, viz., the campaign for a larger and better building site necessitated by enlarged ideas and purposes for the future of the station, are a far greater good than any sort of an earlier dedication could have been.

The Work of the Summer.—The paid staff for the season consists of thirteen, five of whom are full-fledged naturalists and eight are their assistants. In addition seven "accommodated" workers are at the laboratory.

Dr. J. F. McClendon, of Randolph-Macon College, Va., has been employed as resident naturalist for the coming year.

No one beyond the Rockies was asked to come to the station this summer. The reasons were several for setting aside this once this especially stimulating and profitable feature of the policy of the directorate. When it became obvious that the little green laboratory building would have to do for the summer's work, consideration of the sardine-like condition of things that would be inevitable among the workers, strongly disfavored the alluring of strangers into the pack. Again, uncertainty as to whether the new boat would be in operation for any part of the season argued in favor of restricting operations to tasks already in hand which could be prosecuted to best advantage with the limited means for collecting that might have to be relied upon. Finally the probability that any naturalists we should care to ask would wish to attend the International Zoological Congress which met in Boston, August 19–23, did not favor an appeal to easterners.

Testing of Policy.—The policy of compensating professional naturalists for carrying on a scheme of investigation definitely undertaken by a marine biological station as a whole is an experiment until now untried, so far as I know. The plan is in its fifth year of testing here at the San Diego station. This period should be sufficient to give some intimation of its feasibility and productiveness. Fathers and mothers are not the most reliable judges of the virtues of their own children. It would be unprofitable for us of this association who have undertaken the experiment to indulge now, in the absence of anybody to criticize, in commendatory remarks on what has been accomplished. It will be enough to look for a moment at the balance sheet of outgo and results.

From 1903, our first year under the present order, up to this summer's work approximately $6,000 have been paid in salaries to naturalists and their assistants.

The product of this outlay stated numerically in terms of the printer's art is as follows: Twenty-three memoirs, aggregating 768 pages of the zoological publications of the University of California, large octavo in size, have been published. The manuscripts of two other memoirs, one of about 150 pages and the other of probably 50, are in the editor's hands awaiting their turn at the University Press. There naturally has not been time for the present summer's work to contribute anything.

No one would, of course, lay much store on this bulk method of estimating the value of the returns for the expenditure. The major part, though by no means all of what has been printed, is concerned with the description and record of organisms living in our area which before were almost wholly unknown. Some 518 kinds of organisms have been studied critically so far as the needs of identification and record are concerned. Of this number 106 have been treated by their authors as new to science, *i. e.*, have been described as new species. It is fair to assert, I believe, that as a result of these four years' work, some at least of the animal groups inhabiting our waters are better known to science than are the same groups of the Atlantic shores of the United States, where marine laboratories have existed and marine collecting has been practised for forty years at least.

It certainly would have been impossible to accomplish more than a small fraction of what has been done, but for the method that has prevailed and with the money to back it. Whether or not the knowledge gained is worth what it has cost I am willing to leave to the contributors of the funds and to the intelligent public.

Another aspect of the policy that I can not refrain from devoting a few sentences to is

that of the utilization of novitiate assistance. The employment of advanced university students to assist the full-fledged investigator in the prosecution of his own researches at a compensation sufficient to cover the student's expenses, is particularly satisfactory. It yields richly in two directions: it increases by as many fold as there are assistants, almost, the productive capacity of the professional, while at the same time it ought to be, and I believe is, a benefit to the students hardly to be secured in any other way. No help is so pleasant to give or so effectual, other things equal, as mutual help; and I know few relationships anywhere in labor that comes nearer realizing the ideal of reciprocal service than this one.

The proposed enlargement of the station's scope being of the future rather than of the past, can hardly claim a place in this report. I merely call attention of the members of the association to the fact that the purposes for which the organization was formed, as indicated in its articles of incorporation, anticipate this or any other expansions that the management may at any time deem wise to undertake.

NEWSPAPER SCIENCE

FINDS A LIZARD 314 FEET LONG.

Wyoming University Expedition Unearths the World's Biggest Fossil.

Baggs, Wyo., July 24.—The most important discovery ever made in the great fossil beds of Wyoming is the skeleton of an animal of the lizard type, just found, which shows a length of 314 feet.

It is by far the largest prehistoric animal yet discovered. The skeleton, which was found by an expedition from the Wyoming State University, is in a perfect state of preservation, every bone seeming to have been in place when petrification set in.

The skeleton is in the side of a hill of shale and has not been torn entirely from the stone in which it is imbedded, but the whole length can be seen.

One vertebra, which has been removed, weighed more than 1,000 pounds. The skeleton will be placed in the Wyoming State University, which has the greatest collection of fossils in the world.—New York *Sun*.

PLEASE NAME THIS FREAK.

Skeleton Resembling Both Horse and Snake Puzzles Naturalists.

Special to the New York Times.

Seneca Falls, N. Y., July 26.—A skeleton to which local naturalists are unable to attach a name was discovered to-night in an excavation here. The frame is five feet long from nose to tail, with two legs fifteen inches long. The head is identical with that of a horse, with deeply sunken eyesockets and massive jaws. On each side of the upper and lower jaws sharp tusks protrude, with a row of fine teeth between. The neck is short, and of graceful curve.

The spine is similar to a snake's, except that it is lined with thirteen ribs on each side and has a ten-inch tail joined directly on the spine. No socket for wings is apparent. The legs have a hip, knee, and ankle joint, and the extremely long toes are said to indicate web feet.

The ground where the object was found has never before been disturbed to the knowledge of local historians.—New York *Times*.

TOMATO ON A DAHLIA BUSH.

Owner Offers $25 for an Explanation of This Freak of Nature.

Special to The New York Times.

Atlantic City, N. J., Aug. 16.—William Wilson, a farmer of Pleasantville, has a freak product in a tomato growing on a dahlia bush. The tomato weighs about a pound, and is removed from the nearest tomato vine by at least 150 feet.

Wilson offers $25 to any one who can explain the freak of nature.—New York *Times*.

Dr. Hill is often called the "American Archimides," so profound is his knowledge of mathematical astronomy. His researches in connection with the lunar theory secured him some years ago the gold medal of the Royal

Astronomical Society, London. Dr. Hill's many papers on mathematical astronomy have been purchased by the Carnegie Institute. The papers are designated as Hill's collected mathematical works.—Boston *Transcript*.

REORGANIZATION OF THE JOURNAL OF MORPHOLOGY

Plans have just been completed for the re-establishment of the *Journal of Morphology* on a secure financial basis, and the publication of the journal will be resumed immediately. This announcement, which Professor Hubrecht recently characterized as the best piece of news which he had heard since coming to America, has been made possible by the generosity of Dr. Horace Jayne, a friend and former director of the Wistar Institute of Anatomy and Biology. The journal will be published hereafter under the auspices of the institute, which assumes all financial responsibility; it will be edited by a board representing different institutions. The board of editors consists of the following:

E. G. Conklin, University of Pennsylvania.
H. H. Donaldson, Wistar Institute.
M. J. Greenman, Wistar Institute.
G. C. Huber, University of Michigan.
Horace Jayne, Wistar Institute.
F. R. Lillie, University of Chicago.
F. P. Mall, Johns Hopkins University.
C. S. Minot, Harvard Medical School.
T. H. Morgan, Columbia University.
G. H. Parker, Harvard University.
E. B. Wilson, Columbia University.
C. O. Whitman, University of Chicago.

The *Journal of Morphology* was founded in 1887 by C. O. Whitman and E. P. Allis, and it established a reputation for scientific merit and excellence of printing and illustration which was unsurpassed by any similar journal in the world. After the appearance of seventeen volumes the journal was compelled in 1902 to temporarily suspend publication, owing to insufficient financial support.

In the meantime the *American Journal of Anatomy* and the *Journal of Experimental Zoology* have been established and have taken high rank in their respective fields, but the general field of animal morphology has had no organ of publication in this country. During the past five years it has been necessary to send to European journals many contributions within this field, and it has been a source of much anxiety and humiliation to American morphologists that in this great country, where so much research work is being done and where such great sums have been given for the advancement of science, no means existed for the adequate publication of morphological contributions and monographs. This great need will be met in large part by the reorganized *Journal of Morphology*, which will be conducted on the same broad and high plane which has always distinguished it.

SCIENTIFIC NOTES AND NEWS

A. N. SKINNER, professor of mathematics, U. S. N., of the U. S. Naval Observatory, was retired according to law upon reaching the age of sixty-two years on August 12, 1907. Professor Skinner will remain upon active duty, however, until the completion of some unfinished work on the Astronomische Gesellschaft zone $-14°$ to $-18°$, which was observed under his direction from 1892 to 1894. H. L. Rice, formerly assistant astronomer at the observatory, has been appointed to the professorship vacated by this retirement, and H. R. Morgan succeeds Mr. Rice in the position of assistant astronomer. The organization of the work of the observatory has been changed in the direction of the consolidation of the work, and Professor W. S. Eichelberger, U. S. N., has been placed in charge of all the astronomical work of the observatory.

PROFESSORS J. J. STEVENSON and W. M. Davis are the official delegates of the Geological Society of America to the centenary of the Geological Society, of London, to be held this month.

PROFESSOR S. ZABROWSKI, professor of ethnology in the School of Anthropology at Paris, has been elected president of the Paris Anthropological Society.

DR. A. VERNER, professor of chemistry at Zurich, has been elected a corresponding member of the Göttingen Academy of Sciences.

Dr. Edmund Weiss, director of the Astronomical Observatory of the University of Vienna, has celebrated his seventieth birthday.

Dr. Franz von Leydig, formerly professor of anatomy and zoology at Bonn, has celebrated the sixtieth anniversary of his doctorate.

The Broca prize of the Society of Anthropology of Paris has been awarded this year to M. Lapicque for his manuscript entitled "Investigation of the Negro Races." The value of the prize is 1,500 francs. Of this amount M. Lapicque receives 1,200 francs. A Broca medal and 300 francs, with honorable mention, have been awarded to M. Chaquet for his manuscript memoir on "The Teeth According to Sex and Race," and a Broca medal, with honorable mention, to E. Fisher for a research on "The Variations of the Human Radius and Ulna."

Professor W. O. Teague has resigned his position in the experimental engineering department at Purdue University, Lafayette, Ind., to accept the management of the Brookline Motor Car Company, of Brookline, Mass. Professor Teague has been at Purdue for two and a half years in charge of the engineering laboratory, giving especial attention to the work in connection with automobile power.

Charles George Crane, B.S. (Wesleyan '07), has been appointed assistant in the Division of Zoology of the U. S. Public Health and Marine Hospital Service, in the place of Dr. David G. Willets, who has resigned.

Major James Carroll, surgeon, U. S. Army, professor of bacteriology and pathology in the George Washington University, eminent for his investigations on yellow fever, died at his home in Washington on September 16, at the age of fifty-three years.

Dr. Francis H. Markoe, professor of clinical surgery at Columbia University, and previously demonstrator of anatomy, died, on September 13, at the age of fifty-two years.

At a recent meeting of the Kentucky State Bar Association the following resolutions were adopted in regard to expert testimony:

Whereas, The abuses of expert testimony have grown to such proportions as to become a public reproach and often actually to pervert justice; and,

Whereas, The rules of the present system or lack of system regulating such testimony are deserving of the most serious consideration in all the branches thereof; and,

Whereas, The State Medical Association is qualified to give great assistance in consideration of the subject of medical expert testimony; now, therefore, be it

***Resolved*, That this association create a committee to be composed of three members to be appointed by the president, whose duty it shall be to consider the subject of expert testimony in all branches; that said committee be instructed to confer with a like committee from the State Medical Association on medical expert testimony, and further instructed to report back to this association at its next annual meeting.**

The Rome correspondent of the London *Times* reports that the number of states which have ratified the convention for the creation of an International Institute of Agriculture in Rome now reaches 44; and they include almost every country in the world of any importance from the point of view of agricultural production. Of the English colonies and possessions, Canada, Australia and India have applied for separate representation. The palace which is being erected for the institute in the gardens of the Villa Borghese is rapidly approaching completion, and before the end of September will be roofed in. The building, designed by the architect Signor Pompeo Passeroni, promises to do credit to Italian taste. Invitations for the meeting of the permanent committee and for the inauguration of the institute will probably be issued in the course of November next, and with the first meeting of the committee in the spring of next year the institute will enter upon its career of activity. In the meantime, the Italian Royal Commission has appointed Professor Pantaleoni to superintend an inquiry for the purpose of ascertaining exactly the extent of the information which the different countries which have adhered to the convention are in a position to supply with regard to their agricultural production. This information

will be catalogued and classified in a tabulated form, and a report, which will also contain comments on the various statistical methods employed, will be ready for the use of the permanent committee, whose first duty will be to discover the amount and reliable character of the statistics already available and to suggest new means of obtaining information where necessary. A great mass of material bearing on this subject has already been received by the *Consulta* from the countries interested. The Royal Commission has also entrusted Professor Bodio, of the General Bureau of Statistics, with a mission to Germany and Austria in order to study on the spot the systems pursued by those countries for the collection of agricultural reports, and has taken other steps as well in order to extend and improve the statistics furnished in Italy.

AT a meeting of the Association of German Architects and Engineers at Kiel, on August 25, Herr Scholer, an official of the Imperial Canal Office, made some statements with regard to the projected extension of the Kiel Canal, which are reproduced in foreign journals. The widening of the canal has been rendered necessary by the fact that even the battleships of 13,200-ton Braunschweig class, with a beam of 22.2 meters, are nearly a quarter of a meter broader than the sill of the canal, which would thus be totally impracticable for the new 18,000-ton battleships now under construction. As already announced, the depth of the canal is to be increased from 9 meters to 11 meters and the width of the sill from 22 meters to 44 meters, which would give a sectional water area of 825 square meters, instead of the present area of about half that extent. The course of the canal will remain essentially the same, and the widening is, as far as possible, to be confined to one bank in order that traffic may not be interrupted. In view of the not altogether satisfactory channel in the neighborhood of the Upper Eider Lakes, east of Rendsburg, a new cut two kilometers in length is to be dug between Lake Audorf and Lake Schirnau. The channel between Levensau and Holtenau is also to be modified. The sill is to be horizontal, and eleven bays are to be constructed, some of which will be carried sufficiently far back to allow the largest steamers to turn in the canal. At various points, like the low-lying district near the Kuden Lake, considerable difficulties will have to be surmounted, owing to the marshy nature of the soil. No less than 500 cubic meters of material will be built into the new locks at Brunsbüttel. The foundations of the new bridges will be sunk to a considerable depth, so as to permit of their being utilized if still further extensions of the canal should be found necessary in the future. The village of Westerrönfeld, near Rendsburg, will be completely bridged over. At Brunsbüttel 42 houses, some of which are of quite recent construction, will have to be pulled down in order to make way for the canal. The total amount of earth to be excavated is estimated at 100 million cubic meters (3,531,700,000 cubic feet). The entire work will be carried out by the Imperial Canal Office with a reinforced staff.

UNIVERSITY AND EDUCATIONAL NEWS

Two important gifts, made to Yale University during the past week, are announced. Archibald Henry Blount, of Herefordshire, England, has left the university nearly his entire estate, the value of the bequest being estimated at $400,000. The reasons that led Mr. Blount to make this bequest to Yale University are not known. Mrs. James B. Oliver, of Pittsburg, Pa., has given the Sheffield Scientific School $150,000 for a new lecture hall for work in English economics and history. This hall is a memorial to her son, Daniel Leet Oliver, formerly a student in the Sheffield Scientific School, who was killed in an automobile accident last June.

BY the affiliation of the Indiana University and the State College of Physicians and Surgeons, Indianapolis, the name of the medical school is dropped and that of the "Indiana University School of Medicine" substituted. It is specified that the board of trustees of the state university shall have full control of the medical college, but there will be no change in the course of instruction nor in the

faculty. The first two years of work are to be given at the state university, Bloomington, and the last two at Indianapolis.

A DIRECTOR of physical training has been appointed for the Boston School system, and a professional nurse has been assigned to each of the twenty-two districts.

DR. WM. NORTH RICE, professor of geology at Wesleyan University, has been appointed acting president during the absence of President Raymond.

DR. THOMAS T. READ, who has held during the past year the position of professor of mining and metallurgy at Colorado College, has accepted the position of professor of metallurgy at the Imperial University in Tientsin, China. The vacancy at Colorado College caused by his resignation has not yet been filled.

DR. GUSTAVE M. MEYER, of the department of biological chemistry of Columbia University, has been elected head of the department of physiological chemistry at Syracuse University.

E. R. DEWANUP, of the University of Chicago, has been appointed professor of railway management in the University of Illinois.

MR. T. D. BECKWITH, of the Bureau of Plant Industry, Department of Agriculture, Washington, D. C., has been appointed assistant professor of botany and bacteriology at the North Dakota Agricultural College at Fargo, N. D.

NEW appointments at Stanford University for 1907–8 have been made as follows: *In Law:* Mr. Frederic C. Woodward, of Northwestern University, as professor of law; Mr. Joseph W. Bingham, of Cornell University, as acting assistant professor. *In Philosophy:* Mr. Henry W. Stuart, of Lake Forest University, as assistant professor; Mr. George H. Sabine, of Cornell, as instructor. *In Applied Mathematics:* Mr. Sidney D. Townley, of the International Latitude Observatory, Ukiah, California, as assistant professor; Mr. J. D. Suter, of the University of Wisconsin, and Mr. Edward Jordan, of St. Peter's College, Australia, as instructors. *As Librarian:* Mr. George T. Clark, of the San Francisco Public Library. *In Political Science:* Mr. James M. Motley, of Wells College, as assistant professor. *In Romanic Languages:* Mr. A. L. Guerard, of Williams College, as assistant professor; Mr. Ernest G. Atkin, of Cornell, as instructor. *In German:* Mr. George H. Danton, of Western Reserve, as acting assistant professor; Mr. Herman Hilmer, of Michigan University, and Mr. Bruno Boezinger, of Texas, as instructors. *In Education:* Mr. Percy E. Davidson, of New York Normal Training College, as acting assistant professor; Mr. M. E. Dailey, of San Jose Normal School, as lecturer. *In History:* Mr. A. Edward Harvey, Princeton '98, as instructor. *In Drawing:* Mr. Robert B. Harshe, of Nantucket School of Design, as instructor. *In Electrical Engineering:* Mr. W. A. Hillebrand, Cornell '00, instructor. *In Greek:* Mr. Edward W. Hope, of University of Illinois, as instructor. *In Metallurgy:* Mr. Luther W. Bahney, University of California '97, as instructor. *In Civil Engineering:* Mr. J. H. Foss, Stanford '03, and Mr. F. H. Fowler, Stanford '05, as instructors. *In Mechanical Engineering:* Mr. Everett P. Lesley, Stanford '97, and Mr. Robert Harcourt, of San Francisco, as instructors.

THE following appointments have been made at New Hampshire College: William Morton Barrows, M.S. (Harvard '06), assistant in zoology; C. S. Spooner, of the Bureau of Entomology, assistant entomologist; Fred Rasmussen, of the Iowa Agricultural College, associate professor of dairying; J. F. Eastman (Massachusetts Agricultural College '07), assistant agriculturist; W. H. Pew (Iowa Agricultural College '07), assistant professor of animal husbandry; Ray Spencer (Dartmouth '07), instructor in English and modern languages; C. P. Cooper (Ohio State University '07), assistant in mechanics and electrical engineering; T. J. Laton (New Hampshire College '04), instructor in drawing; S. T. Adams (New Hampshire College '06) assistant professor of physics and electrical engineering. E. D. Sanderson, professor of zoology and entomology, has been made director of the experiment station.